

MAINE DEP Nutrient Criteria Plan (25 Feb. 2003)
Responses to EPA Preliminary Review Questions

1. Enforceability. How will the nutrient criteria help Maine make use attainment decisions?

Page 4 of the plan actually states that the "incremental total phosphorus concentration criteria is not used to determine if a lake is attaining the narrative ...WQS." The plan states that Maine DEP is looking at Table 3-2 in the technical guide as the "translator process between the narrative WQS and the acceptable increase in phosphorus concentration - viewed as a surrogate nutrient criteria or control parameter" (page 5 plan).

Maine DEP 'permitted change in trophic state' translator approach to meeting nutrient criteria will be helpful in making use attainment decisions, at least for specific lakes on a case by case basis(as discussed on pages 4 and 6), but its primary use is to guide watershed management decisions in order to avoid WQS attainment violations. A variety of robust trophic parameters (e.g., water transparency, Chl-a), in addition to simply total phosphorus concentrations, are used to determine the use attainment of lake water quality standards.

2. Clarify trophic water quality categories DEP considers as impaired.

Impaired lakes in Maine are primarily found in the poor/restorable water quality category (#5). Lakes which are not attaining the stable or decreasing trophic state water quality standard could also be in the moderate-sensitive category (#4 - increasing trophic state with or without occasional algae blooms), but such lakes would make up only a relatively small subset of this group.

Most of the moderate sensitive lakes, and there are many, are attaining class but are at risk of increasing trophic state or nuisance blue-green algal blooms due principally to a high potential for oxygen loss and/or internal recycling of phosphorus from the lake sediments.

Jeff Dennis notes that "the biggest difference between moderate stable and moderate sensitive lakes is not necessarily their phosphorus concentrations, but their potential to develop an internal recycling problem."

3. Linkage between nutrient criteria and use impairment.

What documentation does Maine have of bloom observations in conjunction with data on SDT, chl-a, and TP?

Maine DEP has a substantial amount of in-lake data & analysis correlating total phosphorus concentrations with Secchi disk transparencies, including analysis of color effects. We have also derived Trophic State Index (TSI) scales (DEP Rules: Chapter 581) which are used to provide evidence of the link between TP, Chl-a, and SDT in (colored vs. non-colored) Maine lakes. Regressions show that TP changes on the order of 1-2 ppb reflect significant differences in SDT measures. Maintaining a 'stable or decreasing lake trophic state,' based on an increase in TP on the order of the established WQ categories, is a rational and conservative approach.

In regard to 'use impairment,' public perception lake survey work (similar to past studies by Vermont, Wisconsin, and Minnesota) has been conducted for Maine lake water quality. Plotting likelihood of human use - vs. lake Secchi disk (water transparency) indicated a 'break point' (one corresponding to a definite loss of value to the user-observer, Boyle et al. 1998) at about 2 meters. This is the same value which the Maine DEP has used for years to define a nuisance blue-green algae bloom in non-colored lakes.

4. Does Maine have a special use classification for dystrophic lakes?

No - as such is not necessary when applying a 'change in trophic state' translator water quality criteria approach. Dystrophic lakes (relatively few of them known in Maine) are accounted for in our 305(b) report, however, none are 303(d) listed. Dystrophic conditions are non human-induced, but are naturally occurring features in the landscape and thus

are not a condition of impairment (38MRSA Section 464.4.c.). In these types of highly colored bog-wetland associated ponds, reduced SDT and increased TP (not a controlling water quality factor in these aquatic systems) cannot be used to assess trophic status impairment, without Chl-a measures as well.

- 5. Would Maine have any trouble discussing (in a plan update) how DEP treats colored lakes differently from non-colored lakes?**

No problem. We have analysed the universe of Maine lakes data & documented significant differences between lakes greater than and less than 30 SPU's in terms of SDT, TP concentrations, and algal bloom relationships. The color of any given lake is accounted for when assigning water quality categories. Highly colored lakes are usually placed in the moderate/stable lake category, with Chl-a levels used as the measure of concern.

- 6. Would Maine have any trouble mentioning (in a plan update) the work underway at UMO on lake sensitivity to eutrophication based on geology?**

No problem. However, at this time, there is little chance that findings from these studies will serve to change our current approach. How a lake responds to increases in TP concentrations is not directly comparable to how it responds to increases in TP loads. The UMO research effort may serve to clarify our ability to accurately perceive a lake's susceptibility to internal sediment recycling of phosphorus and better determine which lakes are moderately-stable vs. ones that are moderately sensitive.

- 7. For rivers, can ME clarify whether or not it will consider the EPA criteria/ reference condition approach?**

Yes, it was considered, in great detail, as was done for lakes. However, the nutrient criteria reference value was found to be unacceptable for Maine Ecoregion VIII. We will continue to use current water use based classifications. At best, we will consider using the EPA criteria/reference condition approach for streams and rivers classified as A or AA.

Maine DEP will further develop statewide criteria based on Maine's statutory water quality classification system, as stated on page 9 of the draft. Criteria will be stratified by class and based on stream trophic status as estimated by a combination of metrics, including measures of in-stream vegetative productivity (i.e., phosphorus, chlorophyll-a, and periphyton density). Additionally, an aesthetics or human perception component may be developed to connect trophic status to the current narrative criteria (i.e., fishable or swimmable).

8. Are nutrient criteria for the different resource categories being developed in some order of priority?

Currently, the developmental sequence is: Lakes - Rivers - Wetlands - Estuaries. While we are closer to developing nutrient criteria for lakes, it is also a priority to conduct sampling in rivers, wetlands, and estuaries in order to expedite the development of nutrient criteria in those resource categories. When more data are available for rivers, wetlands, and estuaries, we will then determine if the lake trophic state index approach could be a useful model for the other water resource categories.

9. Can ME address the issue of ecoregion-specific criteria for rivers and streams?

When more data from rivers and streams are available, we will determine if there are differences between ecoregions or types of rivers/streams that would require the development of different nutrient criteria. However, the variation in nutrient loads to streams in Maine, as elsewhere, is not simply based on geography. A combination of trophic metrics may better evaluate observed changes in stream productivity. For example, rivers with benthic alga can be insensitive to geography. One can have a severe algae problem as a result of nutrient inputs, however, TP can be very low since dissolved-P is rapidly taken up by the algae. At this point, Maine DEP considers the present water quality classification system for streams and rivers in Maine to be more adaptable than the use of ecoregions.

10. Does the Legislature have to approve WQS revisions?

Not directly. The legislature has established the existing Water Classification System for all surface waters. That system assigns uses and water quality characteristics to be attained in each class. The Maine DEP intends to implement nutrient criteria by rule-making that will establish water quality criteria necessary to protect those uses and classification. Pursuant to 38MRSA Section 464.5., the Legislature can review any rules adopted relative to the water quality classification and may submit legislation necessary to clarify legislative intent.

11. Funding needs for rivers & streams criteria development and other aquatic resource areas:

A. Nutrient Criteria Development

\$13,000 - **streams/river** contract for class-specific nutrient data analysis and criteria development. For more information, please contact Melissa Evers at (207) 287-2838 or melissa.evers@maine.gov

Inclusion of algal component in QUAL2E models (funded)

Estuaries project. For more information please contact Lee Doggett at (207) 287-7666 or lee.doggett@maine.gov

B. Characterizing statewide measures of algal productivity in aquatic ecosystems

\$32,000 - Lotic algae sampling and analysis project -

In the 2003 field season, DEP intends to target a variety of reference streams to document natural variability. DEP also intends to target known polluted waters to anchor the other end of the continuum. Most of the money will be spent on the taxonomic identification of samples and biomass measurements (e.g., AFDM, Chl a). The remaining funds will be spent on water samples (e.g., TP, Ortho-P, TKN, etc.) and miscellaneous supplies. In the past, the stream algae project has been funded by Section 319 grants. Due to the current budget crisis, it appears that the project will not receive grant money this year.

For more information, please contact Tom Danielson at (207) 287-7728 or thomas.j.danielson@maine.gov.

\$30,000 - Wetland algae samples and archived samples -

Since 1998, DEP has been developing macroinvertebrate bioassessment methods for wetlands. As part of this initiative, DEP also analyzed wetland water samples for a suite of nutrients (TP, TKN, Ortho P, etc.) for 88 sites (115 sampling events) between 1998 and 2002. During 1998 and 1999, DEP participated in a pilot project with Michigan State University to develop wetland algal assessment methods and indicators.

Based on initial results of the pilot study, algae show great promise as sensitive indicators of wetland nutrient enrichment. For the past several years, funding has not been available to continue the wetland algae project, however DEP has collected algae samples from visited wetlands in the hope that future funds will allow the taxonomic identification of these samples. DEP intends to collect algae samples from additional sites where macroinvertebrates are collected during the 2003 field season. Developing nutrient criteria for wetlands is important because it includes the many small ponds, marshes, and slow moving streams that don't neatly fit into the lake and river/stream monitoring. Funds will be used for taxonomic identification of the new and archived samples.

For more information, please contact **Jeanne DiFranco** at **(207) 822-6424** or **jeanne.1.difranco@maine.gov**.

Literature Referenced

- Boyle, K.J., S.R. Lawson, H.J. Michael, and R. Bouchard. 1998. **Lakefront Property Owners' Economic Demand for Water Clarity in Maine Lakes**. University of Maine, Orono, Maine Agricultural and Forest Experiment Station, Misc. Report 410, September 1998, 20 pages.
- Dennis, J., J. Noel, D. Miller, C. Elliot, M.E. Dennis, and C. Kuhns. 1992. **Phosphorus Control in Lake Watersheds: A Technical Guide to Evaluating New Development**. Maine Department of Environmental Protection, Augusta, Maine.